REMR Technical Note OM-MS-1.5
(Supersedes OM-MS-1.5 1991)

REMR Management System for Rubble Breakwaters and Jetties

Background

The U.S. Army Corps of Engineers is responsible for maintaining several hundred coastal and navigational structures. To assist those involved in planning and budgeting for maintenance and rehabilitation of these structures, a series of REMR Management Systems is being developed. These computerized maintenance management systems are aimed at providing improved and more consistent methods for life-cycle cost comparisons of maintenance and rehabilitation alternatives as well as more effective means for monitoring the condition of facilities. (See REMR Technical Note OM-MS-1.1.)

Overview

A REMR Management System is being developed for breakwaters and jetties of all, or primarily, rubble construction (with either rock or concrete armor). Like the other REMR Management Systems, this one will contain standardized inspection and condition rating procedures, life-cycle cost-analysis routines, and data storage and handling capabilities. The system will also include software for performing required calculations and for producing a variety of reports for work planning and budgeting purposes. Many of these features are common to all the REMR Management Systems.

As with the other REMR Management Systems, the primary driving element is the condition rating process. The condition ratings used in this system follow the standard REMR Condition Index (CI) Scale, as described in REMR Technical Note OM-CI-1.2. The basic process for rubble breakwaters and jetties is diagramed in Figure 1.

To initiate the process, breakwaters and jetties are divided along their length into reaches according to functional and structural criteria. These reach definitions remain for all subsequent condition evaluations.

The Condition Rating Process

The CI value for a breakwater or jetty is produced from a Structural Index (SI) and Functional Index (FI) value. The SI relates to the physical condition

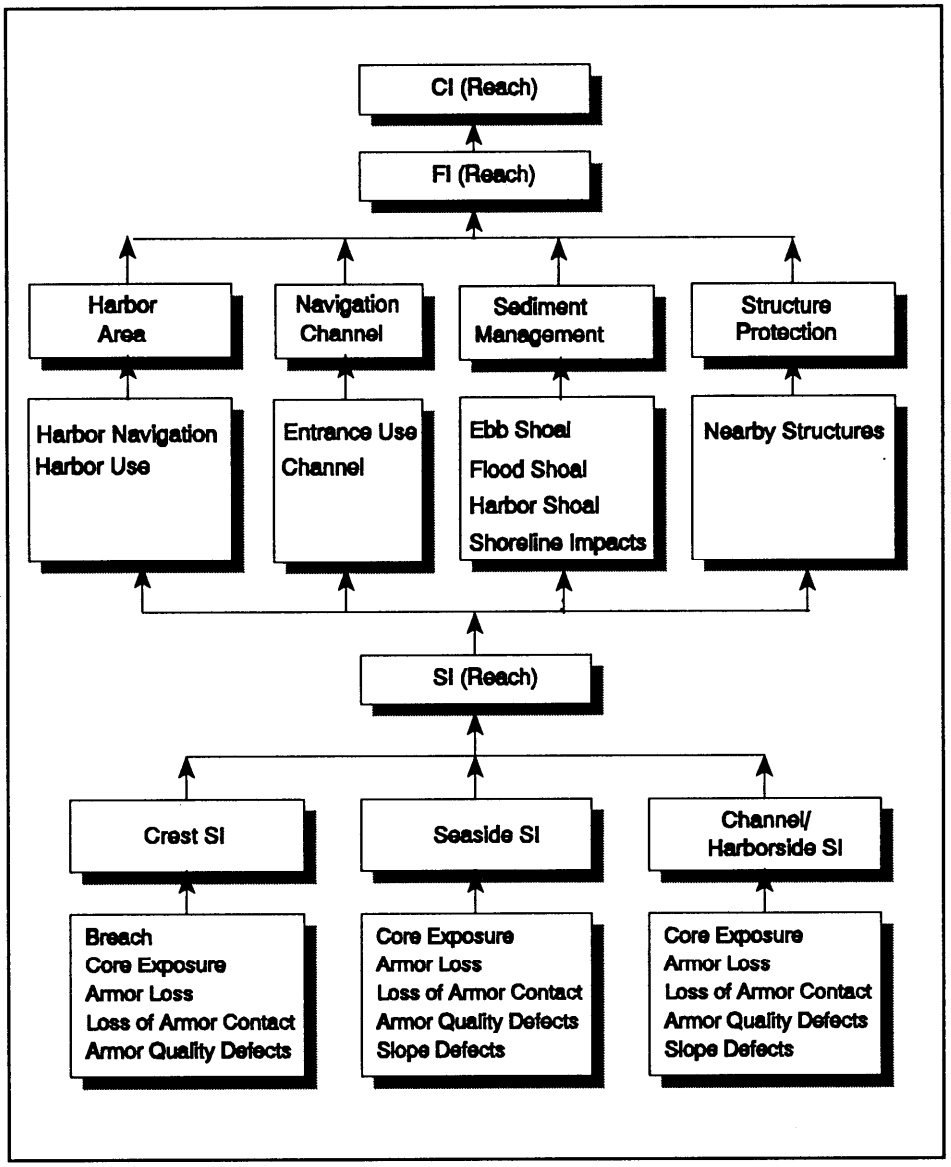

Figure 1. Diagram of condition rating process for one reach

of the structure, while the FI is an indicator of how well the structure is performing its intended functions. As with the CI, the SI and FI also follow the REMR CI Scale.

The SI is obtained first, as indicated at the bottom of Figure 1. For SI rating purposes, each reach of a structure is divided over its cross section into the crest (or cap), seaside slope, and channel (or harborside) slope. (The head is treated as a separate reach with only side slope and crest). Ratings for each cross-sectional part are produced for five structural categories shown in the figure.

The ratings are done in accordance with the rating tables that appear in the system manual. During the structure inspection other observations on the character and extent of defects are also recorded.

The inspection information is then entered into the computer program which will calculate the SI ratings for the crest, seaside slope, and channel/harborside slope for each reach, then an SI for each reach, and finally, an SI for the whole structure.

The FI is based on the performance of the structure in nine functional categories, grouped into four main functional areas, as shown in the figure. Ratings are chosen from functional rating tables and indicate how well the structure performs in its current state, compared to its performance without any structural defects. The resulting FI then becomes the CI for the whole structure.

Application of the System

When the program database includes current and past SI, FI, and CI ratings, the other portions of the program become fully useable. These program features and applications will be similar to those for the other REMR Management Systems, as described in Technical Notes OM-MS-1.1 and OM-CI-1.2.